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A NOTE ON WUNDT'S DOCTRINE OF CREATIVE SYNTHESIS

By E. B. TITCHENER

It was on a country-walk in the spring of 1858, Wundt informs us, that the notion of creative synthesis, which was to play so large a part in his psychological system, first occurred to him as the answer to the riddle of visual space-perception.¹ In formal outline, his doctrine remains the same from the *Beiträge* of 1862 to the *Physiologische Psychologie* of 1910. We all know, however, that between the *Vorlesungen* and the *Physiologische Psychologie* Wundt had radically changed his views; and the story of this change, in the context of space-perception, throws so clear a light on his psychological development and his systematic procedure that I think it worth the telling.

The Period of Unconscious Inferences

For the first account of the doctrine of creative synthesis we turn to the concluding essay of the *Beiträge*. Here Wundt analyses the process of perception into three unconscious acts of inductive reasoning: colligation, synthesis or fusion, and analogy. We consider them in order.

(a) The uniform connection of sensory stimulation with reflex movement means the repeated pairing and therefore the intimate connection of objective with subjective (muscular) sensations. The mind takes cognisance of this paired relationship by an unconscious act of colligation, a form of induction by simple enumeration. Since *A* has, a thousand times over, been followed immediately by *a*, and *B* by *b*, the mind argues that *A* will in the future always be attended by *a*, and *B* by *b*; or, in general, that an objective sensation will always be attended by a subjective sensation. We are still far removed from perception; the combinations *Aa*, *Bb*, leave the component sensations *A*, *a*, *B*, *b*, just what they were; but we have, in the act of colligation, taken the first step toward perception.²

¹*Erlebtes und Erkanntes*, 1920, 181 ff. Cf. Ueber psychische Causalität, etc., *Phil. Stud.*, X., 1894, 123.

²*Beiträge zur Theorie der Sinneswahrnehmung*, 1862, 442. There is here, I think, a confusion, at any rate a verbal confusion, between colligation as external mode of connection (the paired sensations are *ipso facto* colligated) and colligation as unconscious act of generalization (the paired sensations are the material of an enumerative inference). I have read the passage in accordance with what I take to be its general sense.

(b) The essential act is that of synthesis. The mind cannot, however, advance to synthesis of its own accord. Something must happen, something in the nature of an accident, which disrupts the colligation and starts the mind enquiring and comparing.

Suppose, for instance, that there are two luminous points, at fixed distances from the eye, and that they set up two distinct retinal sensations. These objective sensations *A*, *B* are combined with their corresponding muscular sensations *a*, *b*; we have verified our colligation. But suppose further that the points shift to new positions while the eye remains at rest. We now have two objective sensations, *A*, *B*, with no attendant *a*, *b*; our colligation is proved wrong. What happens?—I translate the somewhat cryptic sentences in which Wundt describes the synthetic act.³

"In this way the two distinct retinal sensations are apprehended for themselves alone, and yet at the same time are compared with the muscular sensations that correspond with them. The connection with muscular sensations that colligation has established is broken, since the difference between the retinal sensations conditioned upon the changed position of the luminous points is apprehended for itself alone, and yet at the same time the change of position is measured by the degrees of the corresponding muscular sensations. Here begins the activity of synthesis. In isolating the retinal sensations, but at the same time measuring them by the standard borrowed from the muscular sense, it moulds perception to the form, the constraining impulse to which lies in the sense-impressions,—to the spatial form. Synthesis in perception is thus a creative activity, since it constructs space; but this creative activity is in no way arbitrary; the sensory impressions and the external accidents that play their part in synthesis make it altogether necessary that space be reconstructed with absolute fidelity. The spatial form is the only form that can issue from the logical manipulation of the given elements of knowledge, and the spatial form is therefore the necessary product of this manipulation."

If I may be allowed to paraphrase these sentences in homely English, I think the course of the mind's argument would run somewhat as follows. The situation is, let me repeat, that two objective sensations *A* and *B* are given without their regular subjective accompaniments *a* and *b*. The mind then argues to itself, unconsciously, in this way:

"Here's an astonishing state of things,—a good *A* and a good *B* without a trace of *a* and *b*. How in the world can *a* and *b* have got away? Let me call them up, and see if anything has happened to them. Here's *a*,—it fits all right to *A*; here's *b*,—it fits all right to *B*. There's nothing the matter—curious, though, that *a* is so much stronger than *b*; I never noticed that before. Now I do think of it, I believe that all the local-qualities like *A* have strong *as*, and all the local-qualities like *B* have weak *bs*. Yes, and I believe there's more than that; I believe that if the terms of the old familiar colligation were laid out I should find a real parallelism, graded series with graded series. But then there must be a reason, and I'm sure I don't—yes, but I do! I do see! I've got it! Why, if I only run *A* and *a* and *B* and *b* together, and all the rest in the same way, and just take every two

³*Ibid.*, 444.

in the lump, I can *place* A and B! I *am* placing them; A is there and B is *there!* Eureka! that's what that old colligation was for, only I hadn't sense to see it. What else *could* it have been for, graded local-quality on one side and graded strength of muscle-sensation on the other? The whole arrangement is luminous, once you know how to look at it. Now let me try the thing out elsewhere, and perhaps I'll find the rest of the world luminous too."

Great nonsense, of course. I submit only that it is more or less intelligible nonsense, that it reproduces the gist of Wundt's statement, and that it shows clearly the *locus* of the synthetic act. Not the nature of the associated elements, but the mind's unconscious logical *Verarbeitung* of those elements, is responsible for the emergence of the new type of experience. Left to themselves, under the external conditions of association, the elements would never have got beyond an habitual linkage that kept their character as experiences unchanged. The mind, as Wundt himself puts it later on, is thus like a logically-trained man of science, before whom the facts of colligation are laid with the request that he explain them.⁴ It is true that, when synthesis has done its work, the resultant perception is exhibited to us as something natural and necessary, the only resultant that could have been expected. But just as there never was an unconscious mind whose operations did not reflect the conscious ingenuity of its inventor, so was there never a logically-trained man of science who did not, in the flashing moment of explanatory insight, take his explanation to be final and inevitable.

(c) The office of the third unconscious act, analogy, has been anticipated in the concluding sentence of my paraphrase. Analogy saves trouble and time: the work of synthesis, once done, need not be repeated. The act of analogy is therefore not essential, though without it we should find the business of perception laborious, and might have been satisfied to stop short of the refinements which we have actually achieved.⁵

The popular account in the *Vorlesungen* tells us that colligation is a generalising inference, which takes account only of externals; from the fact that a connection has taken place very often, we infer that it will always take place. Synthesis, on the other hand, searches for the ground of connection. It compares a number of colligations of the same sort, and traces the connective thread that runs through them; the connection then appears as necessary, and is therewith transformed into a fusion of the elements of knowledge. Synthesis thus furnishes something new, namely, the law of connection; it is the creative activity in the process of knowledge. The text then proceeds:

"The analysis which we have given [of space-perception] divides almost of itself into the two stages of colligation and synthesis. A luminous point appears in our field of vision; it arouses a retinal sensation of de-

⁴Ueber die Entstehung räumlicher Gesichtswahrnehmungen, *Philos. Monatshefte*, iii., 1869, 232; reprinted as Das Raumproblem in erkenntnistheoretischer Beleuchtung (1867)—a mistake for 1869—in *Kleine Schriften*, iii., 1921, 406 f.

⁵*Beiträge*, 444 f.

terminate local coloring; and with that is connected a movement-sensation, which in its intensity corresponds exactly with the distance of the stimulated point from the retinal centre. Such colligations are formed in large numbers, since every distinct retinal sensation is connected with a movement-sensation of a certain intensity. But when a number of colligations have taken shape, a comparison of them necessarily follows. Comparison shows that a gradation in the intensity of the movement-sensations corresponds with the gradation in the local coloring of the retinal sensations. In this way the retinal sensations are brought into that quantitative relation which corresponds with the relation of the movements and which—since the movement-sensation is something external to the visual sensation proper—can be apprehended only as an external, extensive relation. The bringing together of the different colligations, their comparison, and the inference based upon it,—all this is the work of synthesis; and the product of the synthesis, space-perception, is a wholly new creation over against the sensations it makes use of.”

When once the act of synthesis has been performed, analogy steps in with a twofold function, anticipatory and time-saving.⁶

The Intermediate Period

It is needless to insist—for no one has made the point more clearly and decisively than Wundt himself—that this elaborate explanation explains nothing. It shows the confusions to which all common-sense psychology is liable, the confusions of logic with psychology, of form with content, of active principle with effect produced. The act of synthesis, in particular, makes flagrant appeal to a logical *deus ex machina*. There is an obscure plausibility as we approach the act, and again as we recede from it; but at the crucial moment we simply shut our eyes and open our mouth and see what applied logic will send us. An unfriendly critic might very well have said that the unconscious mind was hazarding a pure guess—or would have been, had not Wundt known beforehand the answer to the psychological question asked by the facts of colligation.

Wundt himself took the first step toward emancipation from logic in 1867, when he wrote, at the request of the editors of the *Vierteljahrsschrift für Psychiatrie*, a review of recent work in the field of physiological psychology. He still regards perception as a matter of unconscious inferences; but he deliberately drops the explanatory side of his theory, and seeks to develop it in descriptive terms, free of hypothetical entanglements. The sole task of psychology, he says, is to show—the possibility of spatial perception being presupposed—how the mind manages to bring its sensations, which are intensive magnitudes, into spatial order and arrangement; in other words, to exhibit the

⁶*Vorlesungen ueber die Menschen- und Thierseele*, i., 1863, 434 ff. I have not thought it necessary to refer to the deductive procedures of distinction and analysis: see p. 442. In *Beiträge* 439 f. we read that “the individual space-perception is the law which explains a determinate connection of sensations, and space at large is the general law which embraces all individual space-perceptions.”

"instruments and activities" whereby a perception of space arises. The instruments are the two systems of local signs, the one a system of different qualities, the other a system of graded intensities. The activities consist in the interplay of these two systems. "A measure of the spatial distance between any two points can be obtained only by means of an intensively graded system of signs; but a system of qualitatively different signs is required in order that the metric relation obtained by means of the first system may be transferred to the qualitative impressions and in this transference be made permanent. The efficiency of either system thus necessarily depends upon the efficiency of the other." Beyond this point, Wundt says, psychology cannot go. The uniform connection of qualitative local signs and feelings of innervation "is" the perception of space. "And if my critics object that the question of the construction of space out of intensive sensations is, after all, no more answered by my theory than by others, I have nothing to reply. That question, if it is directed to psychology as empirical science, has been wrongly addressed."⁷

It looks, then, as if psychology were coming to its rights. No doubt, the perceptive theory which Wundt is championing presupposes "the familiar psychical processes of association and reproduction, of unconscious judgment and inference;"⁸ but he has been able, nevertheless, to set it up free of logical scaffolding; and the reader who mistrusted the unconscious mind might even now, with sufficient psychological faith, have taken the theory and left the logic. It is, however, plain that Wundt is merely resting, for the moment, at a half-way house. The only plausibility that his theory can boast—and we have seen that, to our modern eyes, it is little enough—derives from the creative act of synthesis. Our supposed reader, for all his psychological good-will, must have been content to argue that, since intensive sensations are the sole possible basis of space-perception, any theory is plausible which assumes a strictly genetic form.⁹ Wundt would hardly be satisfied to make so much virtue out of so bare a necessity. He must, therefore, unless that logical synthesis is to be restored, go further on his psychological way; he must seek a new plausibility, and must raise the question how it is at all possible that intensive sensations be translated into a spatial form. This question he takes up, two years

⁷Neuere Leistungen auf dem Gebiete der physiologischen Psychologie, *Vjs. f. Psychiatrie*, i., 1867, 33, 36, 40, 45, 46. Among the hypotheses dropped is that of the origination of eye-movements in reflexes (38).—Cf. *Philos. Monatshefte*, iii., 1869, 225; *Kleine Schriften*, iii., 1921, 399.

⁸*Vjs. f. Psychiatrie*, i., 1867, 45 f.

⁹Cf. Wundt's criticism of the empiristic theory: *Vjs.*, 39 f., 44. This criticism is renewed in *Philos. Monatshefte*, iii., 1869, 225 ff.; *Kleine Schriften*, iii., 1921, 399 ff.

later, in a detailed study of the genesis of visual space-perception.¹⁰

Space and our conscious contents have after all, Wundt reminds us, certain characters in common. They may both alike be subsumed to the concept of magnitude; they are both continua, magnitudes whose progression is continuous; and they are both continua of manifold dimensions. Here, however, the resemblance ceases. For the dimensions of a continuum may be variously interrelated. They may be disparate, which means that, though they belong to one and the same magnitude, they are otherwise wholly independent of one another and can never pass over into one another. They may be homologous, which means that they not only are themselves capable of continuous progression but also permit of continuous passage from one to another; colors, for example, represent a continuum of two homologous dimensions. And lastly they may be congruent, which means that they are not only homologous but also interchangeable; any given section of one dimension is congruent with an equal section of another. It is plain, now, that space is a manifold continuum of three congruent dimensions, and that our ideational content is a manifold continuum of three disparate dimensions—quality, intensity, time. Hence the question before us runs: How may a continuum of three congruent dimensions be derived from a continuum of three disparate dimensions?

The answer turns on the nature of these dispartes. We can form a continuum of x congruent dimensions if we have given (a) a continuum of x homologous dimensions, to serve as material of measurement, and (b) a continuum of one (disparate) dimension, physiologically connected with it, to serve as measuring scale. By applying scale to material for all possible distances and in all possible directions we render congruent the homologous dimensions of the material and we read x dimensions into the originally one-dimensional scale. The procedure may be described either as the reduction of the heterogeneous material to measurements of a homogeneous scale, or as the multiplication of the homogeneous scale by means of a heterogeneous material. Its result must be the formation of a continuum of congruent dimensions.

Colors, as we have seen, represent a continuum of two homologous dimensions. The system of qualitative local signs is evidently a continuum of the same kind, and thus furnishes

¹⁰See Note 4. The question, after what has been said in the *Vjs.*, can hardly fall within the limits of empirical psychology. In his introductory paragraph Wundt proposes to discuss it "von einer allgemeineren psychologischen Grundlage aus;" but the new title of the *Kleine Schriften* makes it epistemological. The argument is utilized both in the *P. P.*, 1874, 685 f., and in the *Logik*, i., 1886, 459.

us with a material of measurement. In searching for a scale, we have to choose between the two one-dimensional continua—the two remaining disparate dimensions of the total ideational continuum, time and intensity. We can hardly hesitate. Every measurement by a time-scale would depend, first, upon the distance between the terminal points within the qualitative continuum which constituted the limits of the interval to be measured and, secondly, upon the velocity with which this distance had been traversed. The units of the time-scale would thus be variable and incomparable. So we are left with intensity, the intensity of movement-sensations or sensations of innervation; and here we find, in fact, both constancy of metric result when scale is laid upon material, and also that physiological connection between the two factors in measurement which the successful solution of our problem demands. A space of two congruent dimensions is thus assured.

What, then, of the third spatial dimension? We must, obviously, retain our intensive scale; for all three dimensions of space are congruent. But if logic and experiment are at one upon this point, so are they also at one as regards the original material of measurement, which can be nothing else than the third one-dimensional constituent of ideation, namely, time. Time-order in ideation, succession, plays a far larger part in the perception of depth than in the perception of surface, and the perception of depth itself shows always a certain indefiniteness, which points to a more or less variable and unreliable material. Presently, it is true, the work of time may be supplemented by that of other and more dependable materials, such as the stereoscopic differences between the images of the resting retinas. But unless time had been there to play its part as original material of measurement, we should hardly have attained to the perception of the third spatial dimension.

"Now, therefore, we can understand how it comes about that our ideation, which represents primarily a continuum of three disparate dimensions, is able to develop, in space, a continuum of three congruent dimensions." Wundt has answered his new question, and in answering it has once more made his theory plausible.¹¹

The Psychological Period

We may still ask, however, whether this novel plausibility is more than logical. Does the essay of 1869 really do anything else than replace the unconscious induction of 1862 by a process of conscious deduction? And is the theory of visual space-perception, as a psychological theory, itself bettered by the change?

¹¹*Philos. Monatshefte*, iii., 1869, 238 ff.; *Kleine Schriften*, iii., 1921, 413 ff.

We have, fortunately, Wundt's own reply to these objections in the doctrine of the *Physiologische Psychologie*. Five years are still to elapse before that work appears. When it comes, we see that Wundt's thought has profited both by the negative and by the positive results of the articles we have been considering; it has become through and through psychological. On the title-page of the *Beiträge* he could set the Leibnizian motto: *Nihil est in intellectu quod non prius fuerit in sensu—nisi intellectus ipse*; and the *intellectus ipse* shows as the unconscious mind, always ready to explain by inductive argument what otherwise must remain inexplicable. On the title-page of the *Physiologische Psychologie* he might (save for the dog-Latin of it) have set the motto: *Nihil est in intellectu quod non prius fuerit in sensu—nisi processus quidam penitus psychologicus*. The theory of space-perception is henceforth a psychological theory, wrought out in terms of immanent psychological process.¹²

We are all familiar with the details, and I need not spend time on them. The uniform teaching of the *Physiologische Psychologie* is that the "idea of space issues in every case from the connection of a qualitative manifold of peripheral sensations with the qualitatively uniform feelings of innervation, which by their intensive gradation are suited to serve as a general measure of magnitude," and that this issuance is psychologically conditioned.¹³ The form of the statement changes, of course, but its substance remains. We have all learned it, and we are all prepared to reject it. Let us not forget, however, the tremendous array of experimental evidence that Wundt was able to set forth in favor of his hypothesis; let us not forget either the conceptual background against which he worked, and in particular the vague evolutionism of the late sixties and the seventies, which would make no bones of deriving space from the non-spatial. The synthetic theory was boldly planned and conscientiously wrought. It not only marked, scientifically and critically, a vast improvement on the older views, but for many

¹²As early as 1869 we find Wundt saying that "our consciousness does not originally possess the idea of space, but forms that idea by way of a *psychological process*" (italics mine): *Philos. Monatshefte*, 238; *Kleine Schriften*, iii., 413.

¹³The sentence quoted stands in 1874, 641; ii., 1880, 177 (sensations of innervation); ii., 1887, 207 (sensations of movement); ii., 1893, 233. In the first three editions Wundt's theory is genetic and synthetic; in the fourth it is a genetic theory of associative fusion. In the fifth and sixth editions the theory is a preempiristic and genetic theory of complex local signs, and the sentence changes to: "Only the conjunction of 'retinal image' and 'movement image' can produce the actual image of the object" (ii., 1902, 686; ii., 1910, 736). The identity of doctrine is affirmed in ii., 1910, 736, note 1.—The difference between the view of 1869 and that of 1874 is shown in a couple of sentences, 1874, 629 f.

years it also stood *facile princeps* among its contemporaries. And even now we, who have passed beyond it, cannot replace the Wundtian doctrine by anything as solid, as comprehensive, as unitary; the great single problem has split up into part-problems, and for these there is still a sad lack of phenomenological observation.¹⁴

I shall say no more, then, of the theory of creative synthesis. I wish rather, in conclusion, to call attention to certain corollaries to the preceding discussion,—points of unequal importance, but all illustrative of Wundt's personal 'psychology.'

(1) In the first place, we now seem to have a fairly clear picture of the genesis of the *Physiologische Psychologie*. We know the studies and researches upon which Wundt based his section on the physiological properties of the nervous system. We know that he had materials in the *Vorlesungen* for the section on sensations; and for the *Physiologische Psychologie* he could make use of Helmholtz' *Tonempfindungen* as well as of the *Optik*. We know, from what has been said in this paper, how seriously he had busied himself, in the interval between the two books, with the psychological problem of perception. We know, as I have elsewhere shown, that the doctrine of apperception shaped itself while the *Physiologische Psychologie* was actually preparing.¹⁵ We know of his study of historical and current systems of psychology. We know, finally, of his physiologically motivated interest in the reflexes, and of his social-psychological interest in expressive movements: in 1874 he had the use, too, of Darwin's *Expression of the Emotions*. All in all, therefore, we possess the materials for a detailed study of the sources and composition of Wundt's greatest book; and we may hope that some one of his pupils will presently undertake the task.

(2) It is natural to compare Wundt's doctrine of creative synthesis in perception with the 'mental chemistry' of the associationists.¹⁶ There is, of course, no reference to mental chemistry in the *Beiträge* or the *Vorlesungen*. For one thing, unconscious logic was there making the requisite synthesis; chem-

¹⁴This breaking-up of the perceptive problem has meant also, of course, a shift of perspective or point of view. See esp. O. Külpe, *Grundriss d. Psych.*, 1893, 349.

¹⁵This JOURNAL, xxxii., 1921, 596 f.

¹⁶In *A History of the Association Psychology* (1921, 179, 264 f., 289 f., 293 f., etc.) H. C. Warren has emphasised the importance of this concept to associationism. I hope to return to the subject in a later Note.

istry was not needed.¹⁷ For another thing, the space which results from the logical act is still, on the face of it, a natural and necessary resultant; nothing else could have been expected; whereas it is of the essence, *e. g.*, of J. S. Mill's mental chemistry that the unexpected happens; who should anticipate the issuance of white from the prismatic colors? We may accordingly find it the more significant that references to Mill occur in all six editions of the *Physiologische Psychologie*.¹⁸ There could be no better proof, in a matter of detail, of Wundt's intention to psychologise his theory of perception.

(3) Lastly, I offer this paper as an illustration of one of Wundt's salient traits,—his profound respect for the continuity of his own thinking. As we pass from the *Vorlesungen* to the *Physiologische Psychologie*, we enter a new world. Wundt has discarded all the cumber of unconscious inference and can attack the preceptive problem psychologically. But he does not start afresh: that is the characteristic point of our whole story: he rather holds fast to the concept of creative synthesis, and seeks only to psychologise it. This temperamental trait, the tendency to retain his original conceptual tools long after they have done the work for which he forged them, runs through all his systematic work. It explains why there are two distinct theories of creative synthesis; it explains how he could pass as easily as he did from a sheerly motor sensation of innervation to "memory-images of movement-sensations;"¹⁹ it explains why his doctrine of apperception represents not one but several theories.

¹⁷Wundt was familiar with the work of the British associationists, and also in all likelihood with the *Beytrag zur Physiologie der Sinne* of J.G. Steinbuch (1811). He tells us in 1869 (*Kleine Schriften*, iii., 407) that he deliberately turned his back upon associationism in order to make his experiment in logicism.

¹⁸See 1874, 639 f.; ii., 1880, 175 f.; ii., 1887, 205; ii., 1893, 231; ii., 1902, 684; ii., 1910, 734. It is odd to find Wundt, in the last two editions, turning the tables on Mill by the remark that Mill's mental chemistry fails to lay due stress on the 'creative character of this psychical synthesis!'

¹⁹Cf., *e. g.*, *Vorlesungen*, i., 1863, 221 f. (or *Vjs.*, i., 1867, 47) with *Zur Lehre von den Gemüthsbewegungen*, *Philos. Studien*, vi., 1891, 387 f.